

**Amendments to the Claims:**

This listing of claims will replace all prior versions, and listings, of claims in the application:

**Listing of Claims:**

1. (Cancelled)
2. (Currently Amended) A molecular detector as described in claim + 47, wherein the at least one first resonator comprises a resonator selected from the group consisting of: vibrational resonators, rotational resonators, torsional resonators and composite resonators.
3. (Currently Amended) A molecular detector as described in claim + 47, wherein the at least one first resonator is a notched vibrational cantilever.
4. (Currently Amended) A molecular detector as described in claim + 47, wherein the at least one first resonator is biofunctionalized with a the first receptor.

Claims 5-10 (Cancelled).

11. (Currently Amended) A molecular detector as described in claim + 47, wherein the at least one first resonator is made from a material selected from the group consisting of: silicon oxide, silicon, silicon carbide and gallium arsenide.
12. (Currently Amended) A molecular detector as described in claim + 47, wherein the detector is integral with the at least one first resonator.
13. (Currently Amended) A molecular detector as described in claim + 47, wherein the detector is a piezoresistive transducer.
14. (Original) A molecular detector as described in claim 13, wherein the transducer is made of p+ doped silicon.
15. (Currently Amended) A molecular detector as described in claim + 47, wherein the detector is an optical detector.

16. (Currently Amended) A molecular detector as described in claim + 47, wherein the detector is a lock-in detector.

17. (Currently Amended) A molecular detector as described in claim + 47, wherein the at least one first resonator has a thickness between about 10 nm and 1 $\mu$ m, a width between about 10nm and 1 $\mu$ m, and a length between about 1 $\mu$ m and 10  $\mu$ m.

18. (Currently Amended) A molecular detector as described in claim + 47, wherein the at least one first resonator has a resonance motion vacuum frequency between about 0.1 and 12MHz.

19. (Currently Amended) A molecular detector as described in claim + 47, wherein the at least one first resonator has a force constant between about 0.1mN/m and 1 N/m.

20. (Currently Amended) A molecular detector as described in claim + 47, wherein the at least one first resonator has a Reynolds number between about 0.001 and 2.0.

21. (Currently Amended) A molecular detector as described in claim + 47, wherein the at least one first resonator has a mass loading coefficient between about 0.3 and 11.

22. (Currently Amended) A molecular detector as described in claim + 47, having a force sensitivity of about 8fN/ $\sqrt{\text{Hz}}$  or greater.

23. (Currently Amended) A molecular detector as described in claim + 47, wherein the at least one first resonator is biofunctionalized to detect a receptor/ligand interaction.

24. (Currently Amended) A molecular detector as described in claim + 47, wherein the at least one first resonator is biofunctionalized to detect DNA hybridization.

25. (Currently Amended) A molecular detector as described in claim + 47, wherein the at least one first resonator is biofunctionalized to detect a chemical bond.

26. (Currently Amended) A molecular detector as described in claim ~~4~~ 47, wherein the at least one first resonator is biofunctionalized to detect protein unfolding.

Claims 27-33 (Canceled).

34. (Currently Amended) A molecular detector as described in claim ~~4~~ 47, wherein the detector is a detector which is adapted to measure a change in damping of resonance motion of the at least one first resonator in response to a molecular binding event on the at least one first resonator.

35. (Currently Amended) A molecular detector as described in claim ~~4~~ 47, wherein the at least one first resonator comprises a cantilever having at least two dimensions of one micron or less.

Claims 36-41 (Cancelled).

42. (Currently Amended) A molecular detector as described in claim ~~40~~ 47, wherein the at least one first resonator is biofunctionalized with a the first receptor and the substrate is biofunctionalized with a the second ligand.

Claims 43-45. (Cancelled).

46. (Currently Amended) A molecular detector as described in claim ~~37~~ 47, further comprising a driving element capable of mechanically displacing the first resonator at a chosen frequency.

47. (Currently Amended) A molecular detector capable of detecting ~~molecules~~ an analyte in solution comprising:

a solution reservoir;

at least one first nanometer-scale mechanical resonator which is disposed within the reservoir, wherein the at least one first resonator is biofunctionalized with a first receptor or a first ligand;

a substrate or a second mechanical resonator which is disposed within the reservoir, wherein the substrate or the second resonator is biofunctionalized with a second receptor or a second ligand, and wherein the first receptor or ligand and the second receptor or ligand are capable of binding to ~~a third receptor or a third ligand~~ the analyte in a solution such that the ~~third receptor or ligand~~ analyte binds to both the first receptor or ligand and to the second receptor or ligand at a same time; and

a detector in signal communication with the at least one first resonator for measuring a mechanical displacement of the resonator for detection of the analyte.

48. (Cancelled).

49. (Previously Presented) A molecular detector as described in claim 47, wherein the detector comprises a piezoresistive detector layer which is located on the resonator.

50. (Previously Presented) A molecular detector as described in claim 47, wherein the substrate is disposed in the reservoir.

Claims 51-60 (Cancelled).